

5     **SPECIFICATION**

**TO ALL WHOM IT MAY CONCERN:**

Be it known that I, Gerald Bollich, a citizen of the United States of America and a resident of Eunice, Louisiana, have invented a new and useful Agricultural Disc Harrow and Method of which the following is a specification.

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## **APPLICATION FOR PATENT**

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**INVENTION: An Agricultural Disc Harrow and Method**

### 10           **SPECIFICATION**

#### **1. FIELD OF THE INVENTION**

This invention relates generally to a disc harrow towed by a farm tractor or the like, having retractable wheels for transport and more particularly to improvements to such disc harrows including the addition of breaker bars at strategic points and a drag-type soil leveler.

#### 15     **2. GENERAL BACKGROUND**

          In the preparation of soil for planting, a disc harrow, defined as a harrow equipped with a series of sharp metal discs set on edge or at an angle on one or more axles, is frequently used as an implement. Harrows have multiple gangs of discs located independently or in groups of two or more for turning and breaking the soil. These discs are generally arranged in a  
20    wide range of configurations designed to provide maximum soil disruption over as large an area as possible in a single pass. Even so, some earth remains unbroken, including large clumps

or clods. In some instances picks or breaker bars are used in combination with the disc sets or as a secondary operation to insure uniform earth disruption. Disc uniformity has long been thought to be the best method of insuring uniform soil disruption. However, uniformity has proven to be elusive requiring multiple rows of disc gangs and breakers often set at oblique angles.

Furthermore, farmers find that they must often rotate their discs to compensate for wear or exchange them when damaged. However, when discs are ganged on a single diametrically and spaced and angled accordingly to prevent soil binding between the discs. Single spindle, ganged discs generally require that all discs in a particular gang be set at the same angle of attack, therefore, most harrow discs generally have some means for changing the angulations of all discs in the gang at the same time.

In cases where single disc mountings are utilized the angle of attack may be varied but conventional wisdom and the cost of providing individual, adjustable acute angulations tends to make this feature impractical. Therefore, simultaneous angulations settings remain customary even where single disc mountings are used. Since it is desirable to maintain a consistent depth of spindle, this act becomes a time consuming chore. Discs assembled in a gang are generally all the same size cut and the discs are generally set so that the disc spindles of all gangs are set for the same dimension below the tool bars or some means is provided for raising and lowering the gangs. Any disc that is not of uniform diameter does not cut the soil to the same depth. To insure a uniform depth of cut from each disc, they must be all the same diameter or have some means for individual height adjustment. Disc depth and angle

adjustment coupled with disc wear has long been a costly problem for farmers due to the time required to set both the depth and angulations of each disc and or change-out worn discs. No provision has been made for recycling worn or damaged discs.

It has long been known that a gang disc assembly set at an acute angle of attack helps prevent clogging of soil between discs upon first turning the soil. Adding a second disc gang at an obtuse angle to the first gang helps chop the soil. Such arrangements allow for circular field cultivation. Whereas inline disc gangs towed or attached in a three- point hitch arrangement located perpendicular to the direction of travel are used for back and forth field cultivation, the latter arrangement inevitably leaves irregular soil patterns near each end of the disc gangs.

This requires a second or third set of ganged discs to insure proper soil disruption at each end of the disc gangs. It would therefore be advantageous to provide for maximum disruption of the soil at each end of the gangs on the first pass. This is especially advantageous if this could be done without clogging between the discs.

In addition, leveling and smoothing the broken ground, rather than simply further breaking the clods, is a desirable effect and should be accomplished during disc cultivation process. Soil levelers are currently used in secondary operations rather than in combination with the disc harrow.

Current discs are designed to rotate and are often serrated to provide a chopping effect while turning the stubble, grass, etc., under, thus exposing the roots on the surface. However, in some cases it is advantageous to cut the soil without turning the topsoil under, such as where no grass or stubble exists. In such cases rotating the soil is not only unnecessary but also detrimental by

exposing the vital nutrients to the elements of wind and rain. It would therefore be advantageous to simply loosen the soil.

The invention disclosed herein addresses the issues raised above with a novel, simplistic approach.

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### SUMMARY OF THE INVENTION

An agricultural implement consisting primarily of a drawn frame supported on retractable wheels, the frame having a plurality of independently adjustable spindles for setting height and angle of attack for various size rotatable discs. Each disc is staggered to reduce resistance. Each  
10 group of discs further includes descending diameter discs at each end with the angle of attack increasing with each decrease in diameter while spacing between the discs decreases as the diameters are reduced. The implement further includes harrow teeth or picks located at strategic points adjacent the discs to ensure uniform soil disruption. The disc assembly is convertible from single gang to double gang assembly and may include conventional harrow  
15 teeth sets and or unique soil leveler attachments.

### BRIEF DESCRIPTION OF THE DRAWINGS

For a further understanding of the nature and objects of the present invention, reference should be made to the following detailed description taken in conjunction with the accompanying  
20 drawings, in which, like parts are given like reference numerals, and wherein:

**FIG. 1** is an isometric view of the first embodiment of the disc harrow combination;

**FIG. 2** is a top view of the first embodiment shown in **Fig. 1**;

**FIG. 3** is a front elevation view of the first embodiment shown in **Fig. 1** taken along sight line **3-3** seen in **Fig. 2** ;

**FIG. 4** is a rear elevation view of the first embodiment shown in **Fig. 1** taken along sight line **4-4** seen in **Fig. 2**;

**FIG. 5** is a partial side elevation view of the first embodiment shown in **Fig. 1** showing hydraulic lift apparatus in the retracted position;

**FIG. 6** is a partial side elevation view of the first embodiment shown in **Fig. 1** showing hydraulic lift apparatus in the extended position;

**FIG. 7** is top view of a second embodiment of the disc harrow combination;

**FIG. 8** is a top view of the second embodiment shown in **Fig. 7** with optional leveler and smoothing blade;

**FIG. 9** is a partial side elevation of the second embodiment shown in **Fig. 7**;

**FIG. 10** is a side elevation of the second embodiment shown in **Fig. 8**;

**FIG. 11** is a side elevation of the second embodiment shown in **Fig. 8** with hydraulic lift in the extended position;

**FIG. 12** is an isometric view of the second embodiment shown in **Fig. 8**;

**FIG. 13** is an isometric view of the second embodiment shown in **Fig. 8** with duplicate wing disc harrow combination sections pivotally attached at each side; and

**FIG. 14** is a partial isometric view of the first or second embodiments utilizing non-rotating half discs.

## DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

Looking at the first embodiment of the disc harrow assembly **10** shown in **Fig. 1**, it can be seen that the assembly is a towed implement including a pivotal tow tongue **12** and a frame assembly **14** supported by a pair of hydraulically retractable wheel assemblies **16** with the leading tool bar assembly **18** being perpendicular to the tongue **12** that includes a plurality of rotatable discs. The assembly **10** is further provided with a secondary tool bar assembly **20** located directly behind the leading tool bar **18** and in front of the wheel assemblies **16** fitted with a plurality of vertical breaker bar assemblies **24**. An optional third tool bar assembly **22** may be attached to the disc harrow **10** frame assembly **14** behind the hydraulically retractable wheel assemblies **16** if desired.

Turning now to **Fig. 2** we see that the primary or leading tool bar assembly **18** with its plurality of rotatable discs **26** is arranged in an usual manner with one group facing one direction and the second group facing the opposite direction. However, the discs are not uniformly sized in this case. It should be noted that some disc diameters increase in size starting at each end of the groups or sets of discs **27** and **29** until an optimum size diameter is reached. For example Items **30** may be **18** inches in diameter, items **32** may be **20** inches in diameter, while the remaining intervening disc **34-38** may be **22** inches in diameter. It should also be noted that every other disc assembly is staggered by applying a spacer **40** to the mounting bracket **42**. Further attention should be drawn to the increasing angulations  $\xi, \beta, \eta$  of the smaller diameter discs **3**

and **32** always being set greater than that of the larger diameter discs **34-38**. This and the stagger allow for closer spacing of the discs without clogging. Looking now at **Fig. 3** we see that although some of the discs have different diameters, they are all positioned so that their major diameters are in the same plane parallel to the tool bar assembly **18**, i.e. all disc cutting edges resting on a supporting surface. Unlike the prevailing art, it is anticipated that the disc angulations are to be fixed rather than variable. Each disc assembly includes mounting bracket, a vertical leg, and a bearing assembly that allow the disc to rotate typical in the art. Each assembly is independent; therefore, each disc may be changed at will without the need for removing or otherwise disturbing the adjacent discs.

As seen in **Fig. 4** the vertical breaker bar assemblies **24** may be simply a cutting bar or may be fitted with triangular plow points **44** and be spaced directly between the center disc **30** and at each side of the outermost disc or evenly spaced as shown to insure even breaking of the soil behind the discs. In either case, the breaker bar assemblies **24** insure maximum disturbance of the soil. Adding the optional tool bar assembly **22**, as seen in **Fig. 1**, and its breaker bar assemblies helps break the soil into smaller sizes.

The disc harrow assembly **10**, being fitted with hydraulic lifting wheel assemblies **16** for towing as shown in **Fig. 6**, may be lowered to set the cutting depth or fully retracted as shown in **Fig. 5** in a manner generally known within the art.

Looking now at **Fig. 7** we see a second embodiment **46** in which an optional **2<sup>nd</sup>** tool bar **18**, including its disc assemblies and a second breaker tool bar **22**, may be attached to the disc harrow frame assembly **14** aft of the wheel assemblies **16** in place of the breaker tool bar **20** as



seen in **Fig. 5 & 6**. Additional breaker bars may be added to the breaker tool bar assembly **20**, thus making it equivalent to the third tool bar **22** discussed above.

**Fig. 8** shows yet another option that may be added to the improved disc harrow assembly **46** shown in **Fig. 8**. In this case a leveler assembly **48** and a smoothing plate assembly **50** are attached. Elements of the second embodiment **46** may be seen in the side elevation view shown in **Fig. 9** showing the stagger of the vertical breaker bar assemblies **24**.

As may be seen in **Fig. 8, Fig. 10**, and in the isometric view of **Fig. 12**, the leveler **48** utilizes a plurality of right angle shaped bars **52,54** set at acute angles forming a herringbone pattern. Soil is passed along the lower leg of the angle bars **52** in one direction and transferred to the lower leg of the angle bar **54** leading in another direction before being passed under the smoothing plate assembly **50**. As seen in **Fig. 10** springs or other tension systems **56** may be used to maintain tension on the smoothing plate **58**.

In any case, the leveler assembly **48** and the smoothing plate assembly **50** are mounted to the second embodiment in such a manner the leveler assembly **48** and the smoothing plate assembly **50** are flexible relative to the disc harrow assembly **46** but remain in a sufficiently ridged connection so as to allow the leveler and smoother plate assemblies **48, 50** to be lifted by the wheel assemblies **16** as shown in **Fig. 11**.

The combination assembly **60** as depicted in **Fig. 12** may be duplicated and hinged to each side of the assembly **60** as shown in **Fig. 13**. The wing assemblies **60a** and **60b** may be hydraulically lifted for transport in the typical manner currently employed by the art.

Looking now at **Fig. 14** we see another innovation in that the leading disc assembly **18** may be replaced with non-rotatable half discs made from reconditioned broken or worn discs. It has been found that the disc harrow assemblies **10** or **46** are capable of utilizing these half discs **62** to cut the soil in some cases prior to breaking with the breaker bars assemblies **24**, either with or  
5 without the leveler or smoother plate assemblies **48, 50**.

Because many varying and different embodiments may be made within the scope of the inventive concept herein taught, and because many modifications may be made in the embodiments herein detailed in accordance with the descriptive requirement of the law, it is to be understood that the details herein are to be interpreted as illustrative and not in any limiting  
10 sense.